Student Name _____

Teacher Name _____

School _____

System _____

ELSA
ALGEBRA I

Item Sampler

Tennessee End of Course Assessment
English Linguistically Simplified Assessment

Algebra I Form 3

Reporting Category 3: Algebra

PEARSON

Developed and published under contract with State of Tennessee Department of Education by the Educational Measurement group of Pearson, a business of NCS Pearson, Inc., 2510 North Dodge Street, Iowa City, Iowa 52245.

Algebra I Reference Page

Abbreviations for Geometric Formulas

A = area	d = diameter	r = radius
B = area of base	h = height	s = length of side
b = base	ℓ = length	V = volume
C = circumference	P = perimeter	w = width

Perimeter (P) and Circumference (C)

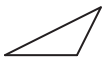
Any Polygon: P = sum of side lengths

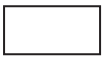
Rectangle: $P = 2\ell + 2w$

Circle: $C = 2\pi r$ or πd

$\pi \approx 3.14$ or $\frac{22}{7}$

Plane Figures — Area (A)

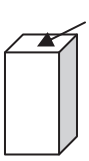
Triangle:  $A = \frac{1}{2}bh$

Rectangle:  $A = \ell w$

Circle:  $A = \pi r^2$

$\pi \approx 3.14$ or $\frac{22}{7}$

Solid Figures — Volume (V)

Right Rectangular Prism: 

$V = Bh$ or $V = \ell wh$

Cube:  $V = s^3$

Algebraic Formulas and Equations

$d = rt$ distance = rate × time

Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

d = distance between two points

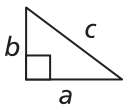
Midpoint Formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Standard Form of a Linear Equation: $Ax + By = C$

Slope-Intercept Equation: $y = mx + b$

Point-Slope Equation: $y - y_1 = m(x - x_1)$

Pythagorean Theorem: $a^2 + b^2 = c^2$ 

Quadratics

For $ax^2 + bx + c = 0$: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Discriminant: $b^2 - 4ac$

Measurement Conversions

LENGTH

1 foot (ft) = 12 inches (in.)
1 yard (yd) = 3 feet
1 yard = 36 inches
1 mile = 1,760 yards
1 mile = 5,280 feet

CAPACITY

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints
1 quart = 4 cups
1 gallon (gal) = 4 quarts

WEIGHT

1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

CONVERSION BETWEEN CUSTOMARY AND METRIC MEASUREMENT

1 yard = 0.9144 m
1 foot = 0.3048 m
1 inch = 2.54 cm
1 quart = 0.946 L
1 ounce = 28.35 g
1 lb = 0.45 kg

Contents

Introduction to ELSA Algebra I

TCAP English Linguistically Simplified Assessment (ELSA)

The End of Course English Linguistically Simplified Assessment (ELSA) is the End of course Assessment in "simplified" English. It is a multiple-choice test designed to measure student achievement in certain skills in two content areas: Algebra I and English II. The questions in this Item Sampler are examples of items used in the actual test.

ELSA test questions

Questions are written to test student performance in state content standards. The State Content Standards and Performance Indicators were developed by the Tennessee Department of Education. These Standards and Performance Indicators are listed on the State Department of Education Web site at http://www.state.tn.us/education/curriculum.shtml.

Test accommodations

The End of Course English Linguistically Simplified Assessment ELSA may be administered using various procedures that are used during the student's daily educational program. Certain conditions must be met for students to be eligible for Special and English Learner (EL) accommodations.

Content of End of Course tests

The testing program titled the *Tennessee End of Course Assessment* was established to meet the Tennessee mandate for end of course assessments in Tennessee secondary schools. These tests measure the Tennessee State Performance Indicators. Subject areas covered by the end of course assessments include Mathematics, Language Arts, History, and Science.

Test development

For the *Tennessee End of Course Assessment,* a staff of writers – composed both of teachers and professional test developers experienced in each of the content areas – researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including certain items and test directions in operational tests.

Test administration

Tennessee End of Course Assessments are given to students as they near the end of courses that are included in the program. Students who are Limited English Proficient (LEP) will be tested using the ELSA test form. Tests may be given midyear for block schedules or at the end of the school year.

You will have ample time to read and answer each of the questions. The ELSA Algebra I test has been designed to be administered in one session and is not timed.

Calculator use is optional. Sharing calculators during testing is not permitted.

The following types of calculators/devices may **NOT** be used during the test:

- pocket organizers
- electronic writing pads or input devices
- Some examples of prohibited calculators are:
    - Casio models: CFX-9970G, Algebra FX 2.0
    - Hewlett-Packard models: HP-40G, HP-49G
    - Texas Instruments models: TI-89, TI-92, Voyage 200, TI-NSPIRE – the CAS version (The non-CAS version of TI-NSPIRE is allowable.)
- calculators that can communicate (transfer data or information) wirelessly with other student calculators/devices
- cell phones, PSPs, and/or iPods
- Students may use any four-function, scientific, or graphing calculator does not have any of the above features. The use of units that have a Computer Algebra System (CAS) is NOT allowed.

Tips for Taking the Test

Preparing for the test

- Take this Practice Test several times
- Review the Tennessee ELSA End of Course Item Sampler for Algebra I located at http://tennessee.gov/education/assessment/sec_samplers.shtml on the Tennessee Department of Education Web site.
- Become familiar with the correct way to mark answers on the answer sheet.

Before the test

- Get a good night's sleep. To do your best, you need to be rested.

During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. First answer all questions that you are sure about.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

Directions for Using the Item Sampler

This Item Sampler for ELSA Algebra I provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given end of course test administration. Performance Indicators have been grouped by Reporting Categories. These Reporting Categories will be used to report information regarding performance on the end of courts test to students, teachers, schools, and systems.

The items in this Item Sampler will not be found in the end of course tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the ELSA End of Course Assessment Practice Test for Algebra I should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

An Answer Key is located in Page 43. Use it to check your answers. Review items that you get wrong.

Reporting Category: Algebra

Numbers 1 through 67

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

1.

In a football tournament, each team plays all the other teams twice. The number of total games played depends on the number of teams in the tournament, as shown in the table below.

Number of Games Played

Number of Teams, n	Number of Games, $f(n)$
4	12
5	20
6	30
8	56

Which function, $f(n)$, gives the number of games played for n number of teams?

- **A** $f(n) = 3n$
- **B** $f(n) = 4n$
- **C** $f(n) = n^2 - 4$
- **D** $f(n) = n^2 - n$

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

2.

Which expression describes the nth term in the sequence below?

2, 11, 26, 47, . . .

- **A** $n + 1$
- **B** $3n - 1$
- **C** $3n^2 - 1$
- **D** $n^3 + 2n - 1$

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

3. **Observe the pattern below.**

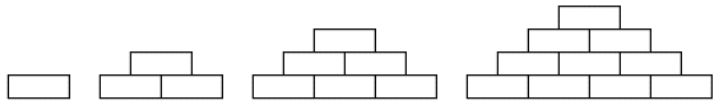


Figure 1 **Figure 2** **Figure 3** **Figure 4**

Which expression represents the number of rectangles that will be in the *n*th figure, if the pattern continues?

- **A** $2n - 1$
- **B** $2n^2 - 1$
- **C** $\frac{n^2 + 1}{2}$
- **D** $\frac{n(n + 1)}{2}$

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

4. **Which expression is equivalent to $(6x^3 + 4x^2 - x + 3) - (4x^3 + 2x - 4)$?**

- **A** $10x^3 + 4x^2 + x + 7$
- **B** $10x^3 + 4x^2 + x - 1$
- **C** $2x^3 + 4x^2 + x - 1$
- **D** $2x^3 + 4x^2 - 3x + 7$

Go On ▶

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

5. **A toy company represents its sales records of two different toys, *P* and *Q*, using the equations below:**

$$P = -8.5t^2 + 45.6t + 325.5$$

and

$$Q = 2.9t^2 - 27.3t + 220.4$$

Which polynomial represents the difference between the amounts of the sales between the two toys?

- **A** $-5.6t^2 + 72.9t + 545.9$
- **B** $-5.6t^2 + 18.3t + 105.1$
- **C** $-11.4t^2 + 72.9t + 105.1$
- **D** $-11.4t^2 + 18.3t + 545.9$

Performance Indicator: 3102.3.3 Factor polynomials.

6. **Factor: $2x^2 + 17x - 84$**

- **A** $(2x - 21)(x + 4)$
- **B** $(2x - 7)(x + 12)$
- **C** $(2x + 21)(x - 4)$
- **D** $(2x + 7)(x - 12)$

Go On ▶

Performance Indicator: 3102.3.3 Factor polynomials.

7. **Which expression below is not equivalent to $54x^4 - 24x^2$?**

- **A** $3x^2(18x^2 - 8)$
- **B** $6x^2(9x^2 - 4)$
- **C** $6x^2(3x - 2)(3x - 2)$
- **D** $6x^2(3x - 2)(3x + 2)$

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

8. **What are the restricted values of x in the following expression?**

$$\frac{2x^2-8}{x^2+3x}$$

- **A** −3, 0
- **B** −2, 2
- **C** 0, 3
- **D** 1, 3

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

9. **Which expression is equivalent to $(2x^2 + 5x - 12)\left(\frac{x^2 - x - 2}{2x^2 - x - 3}\right)$, if $x \neq -1$ and $x \neq \frac{3}{2}$?**

- **A** $(x - 4)(x + 2)$
- **B** $(x + 4)(x - 2)$
- **C** $(x - 4)(x - 2)$
- **D** $(x + 4)(x + 2)$

Performance Indicator: 3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

10. **Melinda wants to buy two T-shirts and some shoes for less than $45. The shoes she wants are $24 and each T-shirt is $$x$. Which inequality shows what the amount of x can be?**

- **A** $x > 21$
- **B** $x < 21$
- **C** $x > 10.5$
- **D** $x < 10.5$

Go On ▶

Performance Indicator: 3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

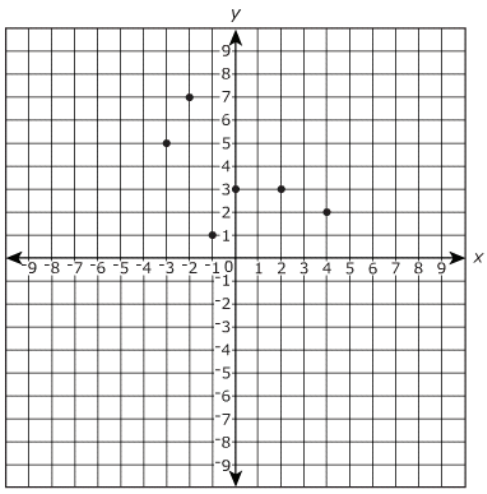
11. **The mean temperature of a city during the month of January is 36°F. The temperature can change from the mean by 10°F. Using the equation below, what is the possible value of the temperature, in °C, on any day in January?**

$$F = \frac{9}{5}C + 32$$

- **A** −20°C
- **B** −7°C
- **C** 5°C
- **D** 12°C

Performance Indicator: 3102.3.6 Interpret various relations in multiple representations.

12. **Which set represents the relation shown on the graph?**



- **A** $\{(-3, 5), (-2, 7), (-1, 1), (0, 3), (2, 3), (4, 2)\}$
- **B** $\{(5, -3), (7, -2), (1, -1), (3, 0), (3, 2), (2, 4)\}$
- **C** $\{5, 7, 1, 3, 3, 2\}$
- **D** $\{-3, -2, -1, 0, 2, 4\}$

Go On ▶

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

13. **What is the domain of the relation shown in the table?**

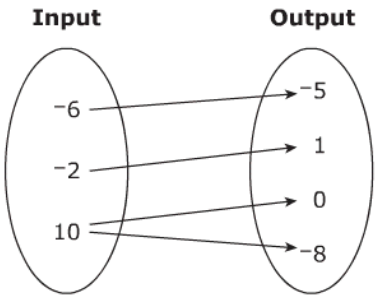
x	*y*
−2	2
3	15
4	7
1	8
9	7
7	−2

- **A** $\{-2, 3, 4, 8, 9, 7\}$
- **B** $\{-2, 3, 4, 1, 9, 7\}$
- **C** $\{2, 15, 7, 8, 7, -2\}$
- **D** $\{2, 15, 7, 1, 7, -2\}$

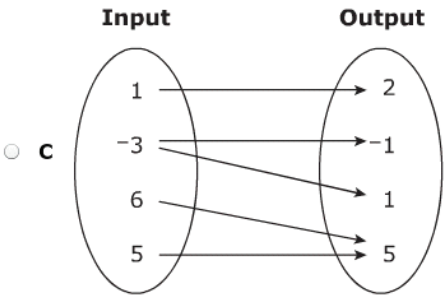
Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

14. **Which relation represents a function?**

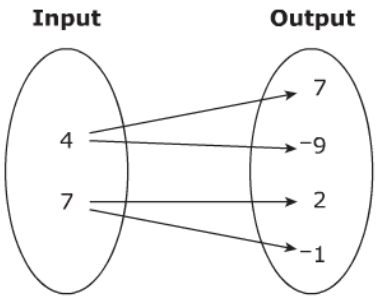
A



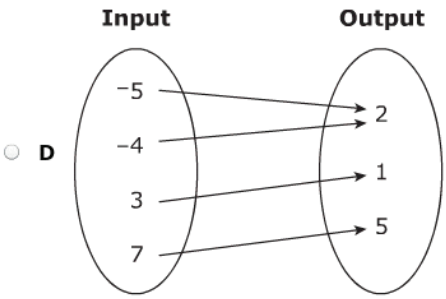
C



B



D



Go On ▶

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

15. **The table below shows the profit students make by selling different numbers of cookies.**

Cookie Sales

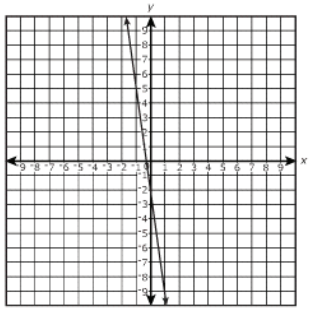
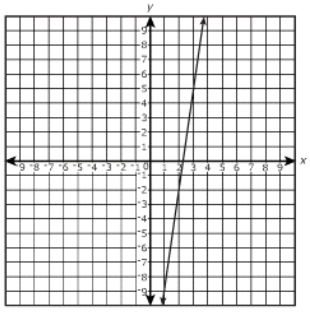
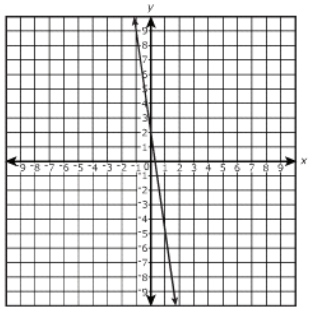
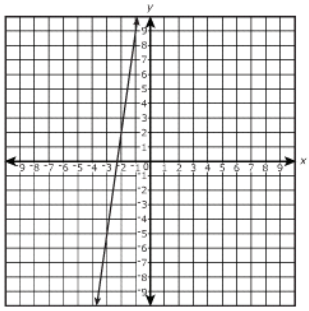
Number of Cookies Sold	Profit Earned
10	$1
20	$2
30	$3
40	$4

What is the range of the function that relates the profit earned to the number of cookies sold?

- **A** $\{1, 4\}$
- **B** $\{10, 40\}$
- **C** $\{1, 2, 3, 4\}$
- **D** $\{10, 20, 30, 40\}$

Performance Indicator: 3102.3.8 Determine the equation of a line and/or graph a linear equation.

16. **Which is the graph of the equation $y + 9 = -7(x - 1)$?**

- **A** 
- **C** 
- **B** 
- **D** 

Go On ▶

Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

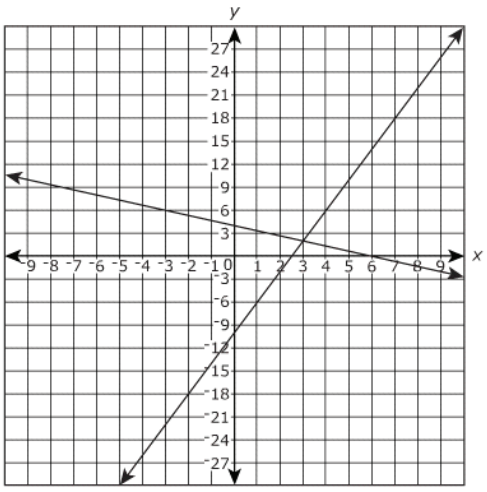
17. **Which ordered pair (x, y) shows the solution for the system of equations shown below?**

$$x - 15y = -227$$
$$15x - y = -45$$

- **A** (15, −2)
- **B** (2, 75)
- **C** (−2, 15)
- **D** (−2, −75)

Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

18. **Which system of linear equations <u>best</u> represents the graph shown below?**

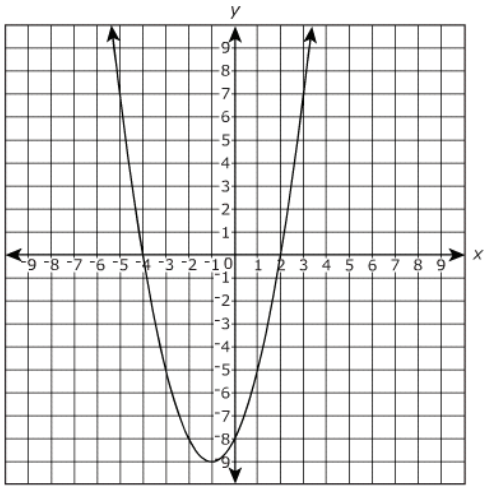


- **A** $2x + 3y = 12$, $4x - y = 10$
- **B** $2x - 3y = 12$, $4x + y = 10$
- **C** $2x + 3y = 12$, $4x + y = 10$
- **D** $2x - 3y = 12$, $4x - y = 10$

Go On ▶

Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.

19. **What are the zeros of the quadratic function graphed below?**



- **A** −4 and −2
- **B** −4 and 2
- **C** 4 and −2
- **D** 4 and 2

Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.

20. **What are the solutions to the quadratic equation shown below?**

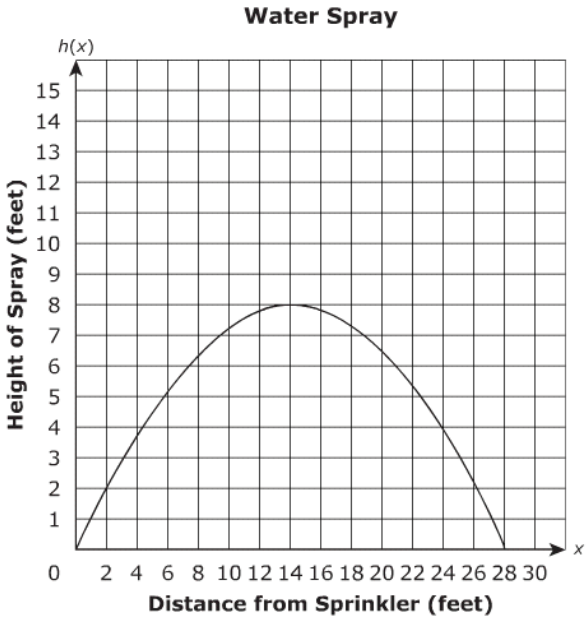
$$21x^2 = 2x + 3$$

- **A** $\frac{3}{7}, -\frac{1}{3}$
- **B** $\frac{1}{3}, \frac{3}{7}$
- **C** $-\frac{3}{7}, \frac{1}{3}$
- **D** $-\frac{1}{3}, -\frac{3}{7}$

Go On ▶

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

21. **A quadratic function is used to show how high water sprays from a fountain. The function shows $h(x)$ as the height of the water and x as the distance from the fountain's center.**

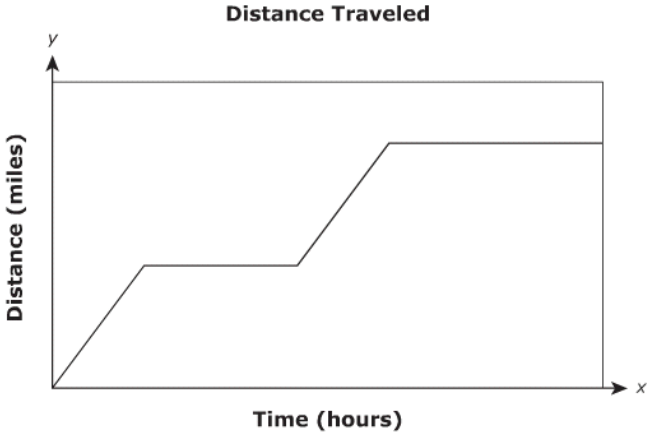


What is the maximum height the water reaches?

- **A** 8 feet
- **B** 14 feet
- **C** 16 feet
- **D** 28 feet

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

22. **The graph below shows the relationship between the distance traveled by a car and time.**



What do the two horizontal segments of the graph represent?

- **A** a car driving at a decreasing speed
- **B** a car driving at an increasing speed
- **C** a car driving on level ground
- **D** a car stopped in traffic

Go On ▶

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

23. **Which function represents the pattern shown in the table?**

x	$f(x)$
1	7
2	4
3	1
4	−2

- **A** $f(x) = x + 6$
- **B** $f(x) = x + 2$
- **C** $f(x) = 10 - 3x$
- **D** $f(x) = 12 - 5x$

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

24. **Look at the pattern below.**

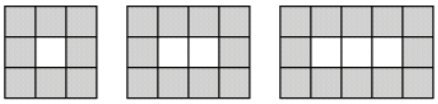


Figure 1 **Figure 2** **Figure 3**

Which expression describes what the *n*th figure of the shaded squares would be?

- **A** $4n$
- **B** $8n$
- **C** $3(n + 2)$
- **D** $2(n + 3)$

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

25. **The length of a rectangle is $3x + 8$ and the width is $2x - 4$. Which expression below represents the area of the rectangle?**

- **A** $6x^2 - 32$
- **B** $6x^2 + 32$
- **C** $6x^2 + 4x - 32$
- **D** $6x^2 + 4x + 32$

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

26. **What is the sum of $(25p^2 + 12p + 43)$ and $(13p^3 - 17)$?**

- **A** $13p^3 + 25p^2 + 12p + 26$
- **B** $13p^3 + 25p^2 + 12p + 60$
- **C** $38p^3 + 12p + 26$
- **D** $38p^3 + 12p + 60$

Go On ▶

Performance Indicator: 3102.3.3 Factor polynomials.

27. **The volume of a box is represented by $2x^3 + 5x^2 + 2x$. Factor this polynomial.**

- **A** $x(x + 2)(2x + 1)$
- **B** $(x + 2)(2x + 1)$
- **C** $x(x - 2)(2x - 1)$
- **D** $(x - 2)(2x - 1)$

Performance Indicator: 3102.3.3 Factor polynomials.

28. **Which expression is equivalent to $27a^3 + 117a^2$?**

- **A** $3a(9a^2 + 13)$
- **B** $9a(3a^2 + 13)$
- **C** $3a^2(9a + 13)$
- **D** $9a^2(3a + 13)$

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

29. **Which is the simplified form of $\frac{(x^2-4)}{(x^2+3x)} \cdot \frac{(x^2-2x-15)}{(10+3x-x^2)}$ including all restrictions on the domain?**

- **A** $-\frac{(x-2)}{x}$, $x \neq -3, -2, 0, 5$
- **B** $\frac{(x-2)}{x}$, $x \neq -3, -2, 0, 5$
- **C** $\frac{(x+2)}{x}$, $x \neq -5, -3, 0, 2$
- **D** $\frac{(x+2)}{x(x-2)}$, $x \neq -5, -3, 0, 2$

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

30. **Which expression is an equivalent form of $\frac{a^3bc^2}{a^2b^3c - bc^3}$ for all defined values?**

- **A** $\frac{ac^2}{(ab + c)(ab - c)}$
- **B** $\frac{a^3c}{(ab + c)(ab - c)}$
- **C** $\frac{a^3c}{(b + c)(b - c)}$
- **D** $\frac{ac}{(b + c)(b - c)}$

Go On ▶

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

31. **Evaluate the expression $\frac{4}{a-3} - \frac{1}{a}$ where $a = 4$.**

- **A** $\frac{1}{4}$
- **B** $\frac{3}{4}$
- **C** $3\frac{1}{4}$
- **D** $3\frac{3}{4}$

Performance Indicator: 3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

32. **Solve $3(2x + 1) + 10 = x + 18$ for x.**

- **A** $\{1\}$
- **B** $\left\{\frac{7}{5}\right\}$
- **C** $\{3\}$
- **D** $\left\{\frac{31}{7}\right\}$

Performance Indicator: 3102.3.6 Interpret various relations in multiple representations.

33. **Solve:** $-4x + 5 \geq -7$

- **A** $x \leq \frac{1}{2}$
- **B** $x \geq \frac{1}{2}$
- **C** $x \leq 3$
- **D** $x \geq 3$

Performance Indicator: 3102.3.6 Interpret various relations in multiple representations.

34. **Which value of *n* proves the inequality?**

$$|2 - 5n| < 10$$

- **A** $-\frac{9}{5}$
- **B** -1
- **C** $\frac{12}{5}$
- **D** 3

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

35. **Which set of ordered pairs represents a relation that is not a function?**

- **A** $\{(-1, 1), (5, 0), (3, 6), (8, 0)\}$
- **B** $\{(-1, 2), (2, -3), (4, 2), (1, 9)\}$
- **C** $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$
- **D** $\{(3, 3), (7, 9), (4, 2), (7, 10)\}$

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

36. **What is the domain of the relation $\{(-4, 5), (-2, -3), (0, 1), (1, -6), (3, 8)\}$?**

- **A** $\{5, -3, 0, -6, 8\}$
- **B** $\{5, -3, 1, -6, 8\}$
- **C** $\{-4, -2, 0, 1, 3\}$
- **D** $\{-4, -3, 0, 1, 3\}$

Go On ▶

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

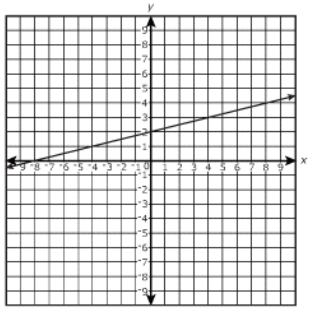
37. **What is the value of the function $f(x) = 2x^2 + 3x - 5$ when $x = -\frac{1}{2}$?**

- **A** −7
- **B** −6
- **C** −4
- **D** −3

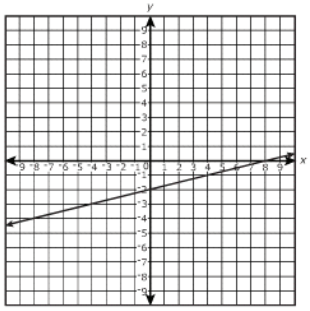
Performance Indicator: 3102.3.8 Determine the equation of a line and/or graph a linear equation.

38. **Which graph shows the line defined by the equation $y = \frac{1}{4}x - 2$?**

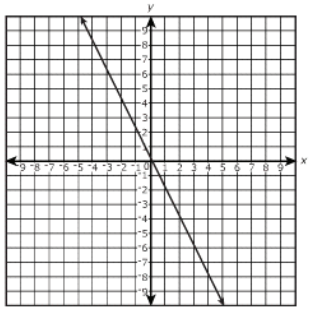
- **A**



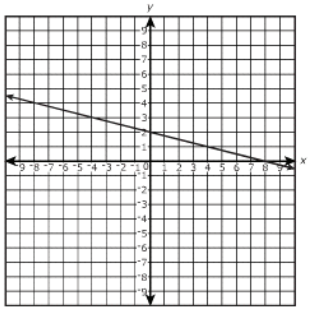
- **C**



- **B**

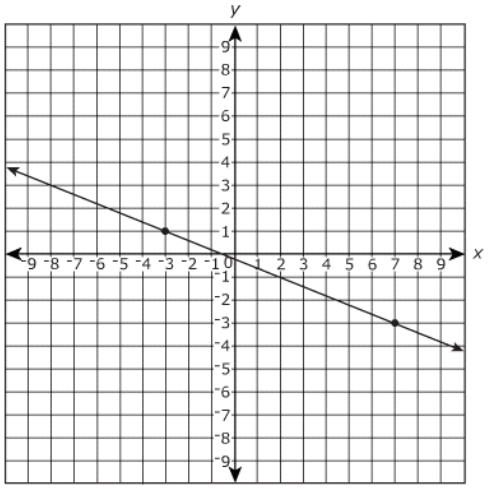


- **D**



Performance Indicator: 3102.3.8 Determine the equation of a line and/or graph a linear equation.

39. **Which equation best represents the graph of the line?**



- **A** $5x + 2y = -1$
- **B** $2x + 5y = -1$
- **C** $5x + 2y = 11$
- **D** $2x + 5y = 11$

Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

40. **Which ordered pair (x, y) shows the solution for this system of equations?**

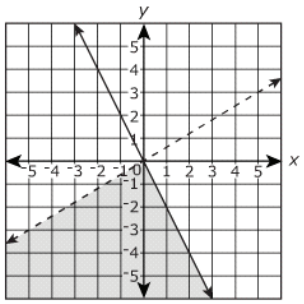
$$9x - 3y = 12$$
$$y = 2x$$

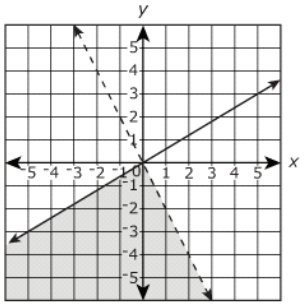
- **A** (1, 2)
- **B** (1, −1)
- **C** (4, 8)
- **D** (8, 4)

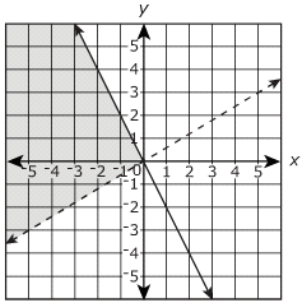
Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

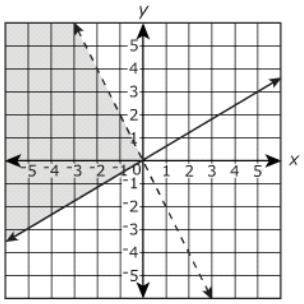
41. **Which graph best shows the solution to the system of linear inequalities shown below?**

$$2x + y \leq 0$$
$$3x - 5y > 0$$

A 

C 

B 

D 

Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.

42. **What are the zeros of the quadratic function shown below?**

$$f(x) = 10x^2 - x - 2$$

- A $\frac{1}{2}$ and $\frac{2}{5}$
- B $-\frac{1}{2}$ and $\frac{2}{5}$
- C $\frac{1}{2}$ and $-\frac{2}{5}$
- D $-\frac{1}{2}$ and $-\frac{2}{5}$

Go On ▶

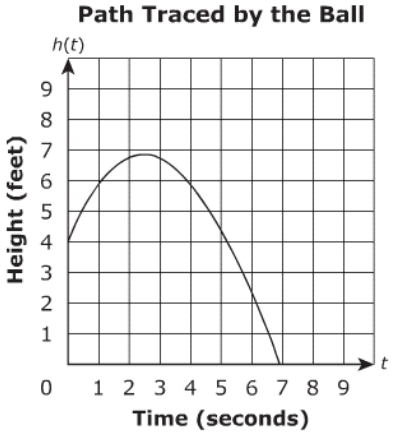
Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.

43. **Solve:** $25x^2 - 9 = 4^2$

- **A** $x = \pm 1$
- **B** $x = \pm 5$
- **C** $x = \pm\frac{\sqrt{7}}{5}$
- **D** $x = \pm\frac{\sqrt{17}}{5}$

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

44. **The graph below shows the path a ball follows when a ball is thrown into the air.**



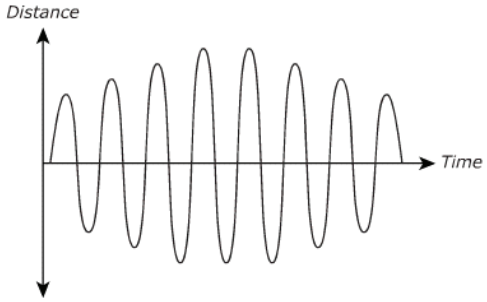
Using a quadratic function where $h(t)$ is height in feet and t is time in seconds, what does the $h(t)$ intercept on the graph represent?

- **A** the height from which the ball is thrown
- **B** the maximum height reached by the ball
- **C** the time taken for the ball to reach the ground
- **D** the time taken by the ball to reach the maximum height

Go On ▶

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

45. **Which scenario could be best represented by the graph?**



- **A** a balloon descending
- **B** a car increasing speed
- **C** a person climbing up the stairs
- **D** a child swinging on a swing

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

46. **Which function will generate the *n*th term of the sequence $-\frac{1}{2}$, 1, $\frac{7}{2}$, 7, ...?**

- **A** $f(n) = \frac{1 - 2n^2}{2}$
- **B** $f(n) = \frac{n^2 - 2}{2}$
- **C** $f(n) = \frac{n - 2}{2}$
- **D** $f(n) = \frac{n - 3}{4}$

Go On ▶

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

47.

Maria created the pattern below with regular pentagons.

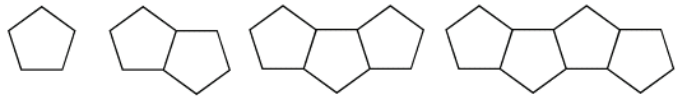


Figure 1 **Figure 2** **Figure 3** **Figure 4**

Which perimeter function, $P(n)$, will Maria use to represent the perimeter of n pentagons and to continue the pattern?

- **A** $P(n) = n + 4$
- **B** $P(n) = 2n + 3$
- **C** $P(n) = 3n + 2$
- **D** $P(n) = 4n + 1$

Performance Indicator: 3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.

48.

Which expression describes the nth term in the sequence below?

$-1, -1, 0, 2, \ldots$

- **A** $\frac{n - 5}{4}$
- **B** $\frac{n^2 - 3n}{2}$
- **C** $n - 2$
- **D** $2n^2 - 3$

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

49. **Simplify:** $\frac{2x^2+9x+10}{2x+5}$, **if** $x \neq -\frac{5}{2}$

- **A** $x + 2$
- **B** $x - 2$
- **C** $2x + 5$
- **D** $10x + 2$

Performance Indicator: 3102.3.2 Operate with polynomials and simplify results.

50. **What is the sum of** $(x^2 - 6x + 10)$ **and** $(-8x^2 + 3x - 5)$**?**

- **A** $-9x^2 - 9x + 15$
- **B** $-9x^2 + 9x - 15$
- **C** $-7x^2 - 3x + 5$
- **D** $7x^2 - 3x + 5$

Go On ▶

Performance Indicator: 3102.3.3 Factor polynomials.

51. **The area of a rectangle is $x^2 + 19x + 60$. Which expression could represent the length of the rectangle?**

- **A** $(x + 10)$
- **B** $(x - 10)$
- **C** $(x + 15)$
- **D** $(x - 15)$

Performance Indicator: 3102.3.3 Factor polynomials.

52. **Factor $4x^2 + 4x - 168$ completely.**

- **A** $4(x + 7)(x - 6)$
- **B** $4(x - 7)(x + 6)$
- **C** $(x + 7)(x - 6)$
- **D** $(x - 7)(x + 6)$

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

53. **Simplify $\frac{a^2 - 4}{18a - 9a^2} \div \frac{a^2 - 2a}{2 + a - a^2}$ for all defined values.**

- A $\frac{(a + 2)}{9(a + 1)}$
- B $\frac{(a - 2)}{9(a + 1)}$
- C $\frac{(a + 2)(a + 1)}{9a^2}$
- D $\frac{(a + 2)(a - 1)}{9a^2}$

Performance Indicator: 3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

54. **Evaluate the expression $\frac{5}{x - 1} - (x - 2)$, where $x = \frac{3}{2}$.**

- A $\frac{9}{2}$
- B $\frac{11}{2}$
- C $\frac{19}{2}$
- D $\frac{21}{2}$

Go On ▶

Performance Indicator: 3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

55. **Which statement could be used for solving this compound inequality?**

$$2x + 7 < 3 \text{ or } 5x + 5 \geq 10$$

- **A** $x < -2$ or $x \geq 1$
- **B** $x > 5$ or $x \leq 3$
- **C** $x > -2$ or $x \leq 1$
- **D** $x < 5$ or $x \geq 3$

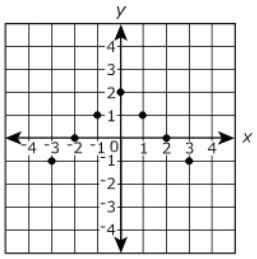
Performance Indicator: 3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

56. **Solve:** $2x + 3^2 = 15$

- **A** $x = 3$
- **B** $x = 4\frac{1}{2}$
- **C** $x = 7$
- **D** $x = 10\frac{1}{2}$

Performance Indicator: 3102.3.6 Interpret various relations in multiple representations.

57. **The graph below represents a relation.**

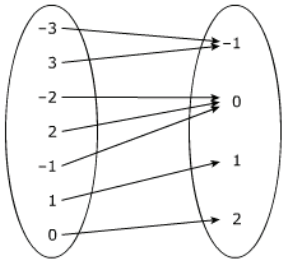


Which of these is not the same representation of the relation?

- **A** $\{(-3, -1), (-2, 0), (-1, 1), (0, 2), (1, 1), (2, 0), (3, -1)\}$
- **B** $y = -|x| + 2$ with domain $\{-3, -2, -1, 0, 1, 2, 3\}$
- **C**

x	y
−3	−1
3	−1
−2	0
2	0
−1	1
1	1
0	2

- **D**



Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

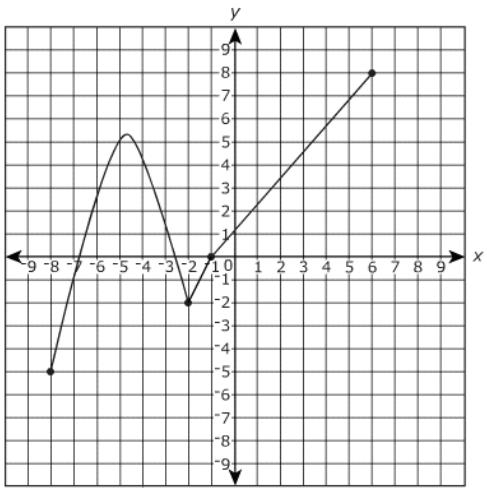
58. **What are the domain and range of the relation $\{(-5, 6), (-1, 3), (0, 0), (7, -9), (4, 2)\}$?**

- **A** domain: $\{-5, -1, 0, 7, 4\}$
  range: $\{6, 3, 0, -9, 2\}$
- **B** domain: $\{-5, -1, 0, -9, 4\}$
  range: $\{6, 3, 0, -9, 2\}$
- **C** domain: $\{6, 3, 0, -9, 2\}$
  range: $\{-5, -1, 0, 7, 4\}$
- **D** domain: $\{6, 3, 0, -9, 2\}$
  range: $\{-5, 3, 0, 7, 4\}$

Go On ▶

Performance Indicator: 3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

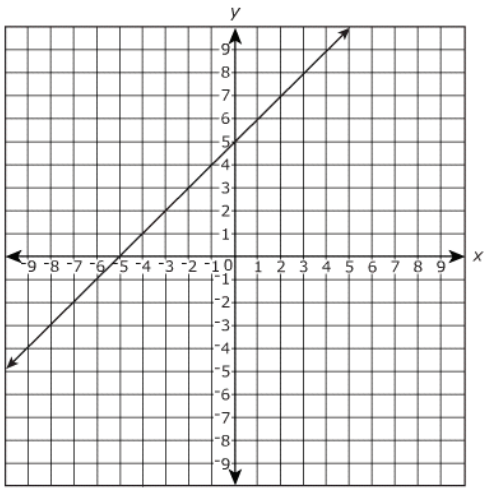
59. **Which expression below represents the range of the function shown in the graph?**



- **A** $-8 \leq x \leq 6$
- **B** $-5 \leq x \leq 8$
- **C** $-8 \leq y \leq 6$
- **D** $-5 \leq y \leq 8$

Performance Indicator: 3102.3.8 Determine the equation of a line and/or graph a linear equation.

60. **Which equation <u>best</u> represents the line shown on the graph?**

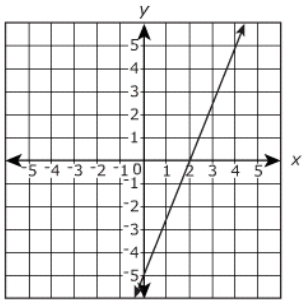


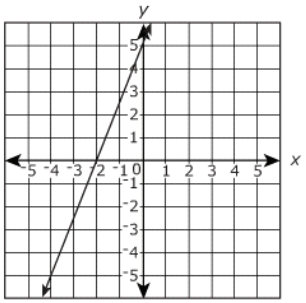
- **A** $x - y = -5$
- **B** $x + y = -5$
- **C** $x - y = 5$
- **D** $x + y = 5$

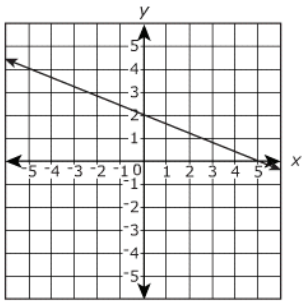
Go On ▶

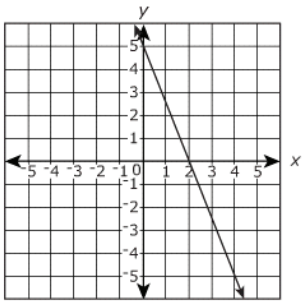
Performance Indicator: 3102.3.8 Determine the equation of a line and/or graph a linear equation.

61. **Which graph best represents the equation $5x + 2y = 10$?**

A 

C 

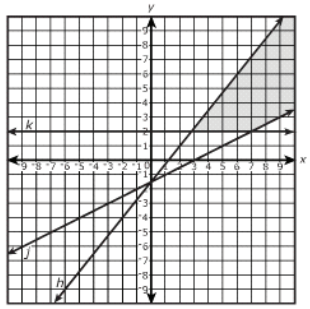
B 

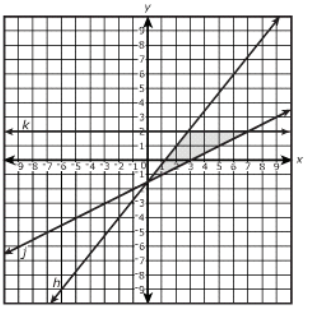
D 

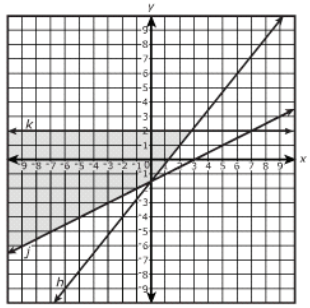
Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

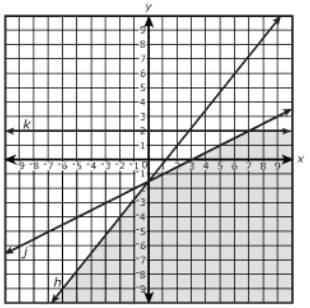
62. **Which graph best represents the solution to the system of linear equations shown below?**

Line h: $5x - 4y \geq 6$
Line j: $x - 2y \geq 3$
Line k: $y \leq 2$

A 

C 

B 

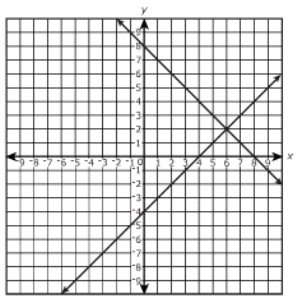
D 

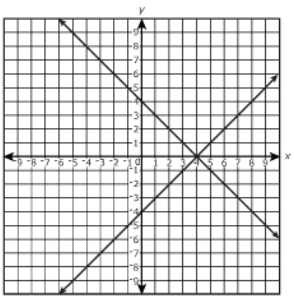
Go On ▶

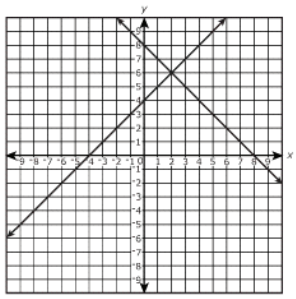
Performance Indicator: 3102.3.9 Solve systems of linear equations/inequalities in two variables.

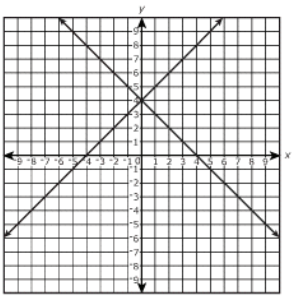
63. **Which graph best represents the solution to the system of linear equations shown below?**

$$x + y = 8$$
$$x - y = -4$$

A 

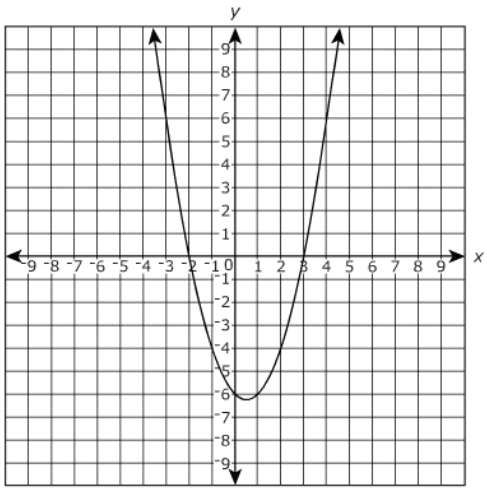
C 

B 

D 

Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function..

64. **What are the zeros of the quadratic function graphed below?**



- **A** (−2, 0) and (3, 0)
- **B** (2, 0) and (−3, 0)
- **C** (0, 0) and (−6, 0)
- **D** (0, 0) and (6, 0)

Go On ▶

Performance Indicator: 3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.

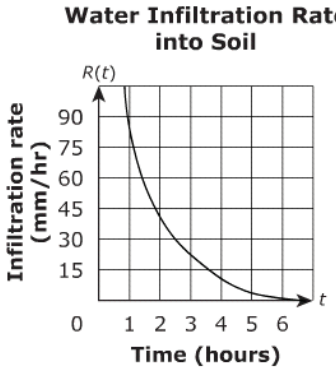
65. **What are the zeros of the quadratic function shown below?**

$$f(x) = x^2 - 2x - 15$$

- **A** −13 and −15
- **B** −5 and 3
- **C** −3 and 5
- **D** 15 and 17

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

66. **Rainfall infiltrates into dry soil at a specific rate, $R(t)$, in millimeters per hour (mm/hr), and it slows down with time, t, in hours. This rate can be modeled by an exponential equation as shown in the graph below.**



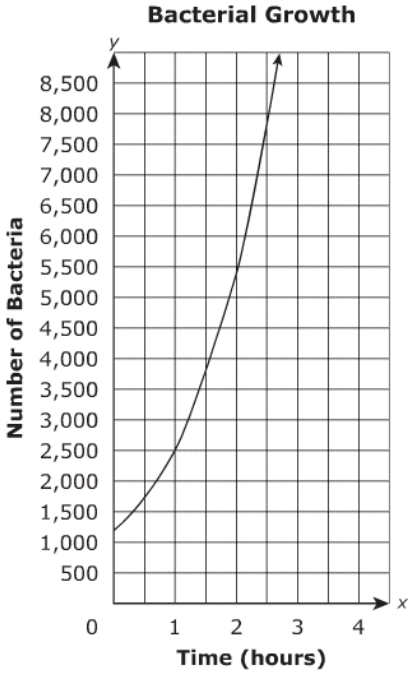
Which value <u>best</u> represents the rate after $2\frac{1}{2}$ hours of rainfall?

- **A** 15 mm/hr
- **B** 30 mm/hr
- **C** 45 mm/hr
- **D** 90 mm/hr

Go On ▶

Performance Indicator: 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

67. **A student watches bacteria growing in a culture as shown in the graph below.**



How many bacteria can the student see after 2.5 hours?

- **A** 1,200
- **B** 3,696
- **C** 5,378
- **D** 7,825

Reporting Category 3: Algebra		
Item Number	**Correct Answer**	**Performance Indicator**
1	D	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
2	C	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
3	D	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
4	D	3102.3.2 Operate with polynomials and simplify results.
5	C	3102.3.2 Operate with polynomials and simplify results.
6	B	3102.3.3 Factor polynomials.
7	C	3102.3.3 Factor polynomials.
8	A	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
9	B	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
10	D	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
11	C	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
12	A	3102.3.6 Interpret various relations in multiple representations.
13	B	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

14	D	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
15	C	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
16	A	3102.3.8 Determine the equation of a line and/or graph a linear equation.
17	C	3102.3.9 Solve systems of linear equations/inequalities in two variables.
18	A	3102.3.9 Solve systems of linear equations/inequalities in two variables.
19	B	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
20	A	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
21	A	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.
22	D	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.
23	C	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
24	D	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
25	C	3102.3.2 Operate with polynomials and simplify results.
26	A	3102.3.2 Operate with polynomials and simplify results.
27	A	3102.3.3 Factor polynomials.
28	D	3102.3.3 Factor polynomials.
29	A	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

30	B	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
31	D	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
32	A	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
33	C	3102.3.6 Interpret various relations in multiple representations.
34	B	3102.3.6 Interpret various relations in multiple representations.
35	D	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
36	C	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
37	B	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
38	C	3102.3.8 Determine the equation of a line and/or graph a linear equation.
39	B	3102.3.8 Determine the equation of a line and/or graph a linear equation.
40	C	3102.3.9 Solve systems of linear equations/inequalities in two variables.
41	A	3102.3.9 Solve systems of linear equations/inequalities in two variables.
42	C	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
43	A	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
44	A	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.
45	D	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

46	B	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
47	C	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
48	B	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
49	A	3102.3.2 Operate with polynomials and simplify results.
50	C	3102.3.2 Operate with polynomials and simplify results.
51	C	3102.3.3 Factor polynomials.
52	A	3102.3.3 Factor polynomials.
53	C	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
54	D	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
55	A	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
56	A	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
57	D	3102.3.6 Interpret various relations in multiple representations.
58	A	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
59	D	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
60	A	3102.3.8 Determine the equation of a line and/or graph a linear equation.

61	D	3102.3.8 Determine the equation of a line and/or graph a linear equation.
62	D	3102.3.9 Solve systems of linear equations/inequalities in two variables.
63	B	3102.3.9 Solve systems of linear equations/inequalities in two variables.
64	A	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function..
65	C	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
66	B	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.
67	D	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.